

Citation:

Jakobsen MU, Bysted A, Andersen NL, Heitmann BL, Hartkopp HB, Leth T, Overvad K, Dyerberg J. Intake of ruminant trans fatty acids and risk of coronary heart disease-an overview. *Atheroscler Suppl*. 2006 May; 7 (2): 9-11. Epub 2006 May 18. Review.

PubMed ID: [16713389](#)

Study Design:

Narrative Review

Class:

R - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To review studies examining the effect of the intake of ruminant trans-fatty acids on the risk of coronary heart disease (CHD).

Inclusion Criteria:

Article inclusion criteria not described.

Exclusion Criteria:

Article exclusion criteria not described.

Description of Study Protocol:**Recruitment**

- Article selection methods not described
- Search terms used to locate articles not described.

Design

- Narrative Review that reviewed findings of primarily epidemiological studies that examined the effects of different quintiles of intake of ruminant trans-fatty acids (R-TFA) and industrially produced trans-fatty acids (IP-TFA) on coronary heart disease risk factors

- Three prospective cohort studies, one case control and one descriptive study were examined.

Dietary Intake/Dietary Assessment Methodology

Not applicable.

Blinding Used

Not applicable.

Intervention

Not applicable.

Statistical Analysis

Examined the relative risk of coronary death and CHD, with confidence intervals, for the highest vs. lowest quintiles of intake of ruminant trans-fatty acids and industrially produced trans-fatty acids for most of the studies.

Data Collection Summary:

Timing of Measurements

Not applicable.

Dependent Variables

- Variable 1: Risk of coronary death (unknown how measured)
- Variable 2: Risk of coronary health disease (unknown how measured).

Independent Variables

- Intake of ruminant trans-fatty acids (R-TFA) (based on quintiles of intake) (unknown how measured)
- Intake of industrially produced trans-fatty acids (IP-TFA) (based on quintiles of intake) (unknown how measured).

Control Variables

Not applicable.

Description of Actual Data Sample:

- *Initial N*: Does not apply to narrative review
- *Attrition (final N)*: Does not apply to narrative review
- *Age*: Not mentioned in any of the studies except for study six which reported the median intake of R-TFA within certain age groups in the Danish population and a graph depicting absolute intake of R-TFA among specific age groups (one to six years, seven to 14 years, 15-29 years and 30-80 years) in the Danish population
- *Ethnicity*: Not reported
- *Other relevant demographics*: Not reported
- *Anthropometrics*: Not reported
- *Location*: Not formally reported for all studies.

Summary of Results:

Key Findings

- **Finding 1**: Two prospective cohort studies found an inverse association between energy-adjusted R-TFA intake and risk of coronary heart disease (CHD):
 - Study 1: Willett W et al, 1993 found that the relative risk of CHD for the highest vs. the lowest quintile of energy adjusted R-TFA was 0.59 (95% CI 0.30-1.17)
 - Study 2: Pietinen P et al, 1997 found that the relative risk of coronary death for the highest vs. the lowest quintile of energy adjusted R-TFA was 0.83 (95% CI 0.62-1.11)
- **Finding 2**: A case-control study (Ascherio A et al, 1994) found that the relative risk of myocardial infarction for the higher vs. lowest quintile of energy-adjusted R-TFA intake was 1.02 (95% CI 0.43-2.41).
- Findings 1 and 2 might imply that intake of R-TFA, as C18:1,t11 (vaccenic acid) is innocuous or even protective against CHD. Isomers of C18:1 trans are the major part of TFA in ruminant fat and in industrially produced partially hydrogenated edible fats of predominantly vegetable origin
- **Finding 3**: One prospective cohort study (Oomen C et al, 2001) found non-significant direct associations between intake of R-TFA and IP-TFA and risk of CHD.

Other Findings

- Comparisons between intake of R-TFA and intake of IP-TFA and risk of CHD in three (Willett W et al, 1993; Pietinen P et al, 1997; Ascherio A et al, 1994) of the four studies were based on quintiles of intake which implies that the associations between the two sources of TFA and risk of CHD were described across different ranges of intake; as follows:
 - For R-TFA, the quintiles covered the range of average intake from about 0.5 to

- 2.5g per day
- For IP-TFA, the quintiles covered the range from about 0.1 to 5.1g per day
- A fifth study (Weggemans R et al, 2004) found that:
 - When comparisons were made for intake up to 2.5g per day, no differences in risk of CHD for R-TFA and IP-TFA were found, and
 - At higher intakes, both intake of total TFA and intake of IP-TFA were found to be associated with increased risk of CHD, but there were insufficient data available on R-TFA
- A sixth study (Jakobsen M et al, 2006) found that the Danish diet contains a high amount of dairy products with a high content of fat leading to a high intake of R-TFA; e.g., the median intake of R-TFA among those 30-80 years of age was 1.8g per day (0.7% of energy intake) with 90% central range being from 0.8 to 3.4g per day (0.4-1.1% of energy intake)
- For 0.5% higher level of energy intake from R-TFA, the relative risk of CHD was 1.17 (95% CI 0.69-1.98)
- For IP-TFA, the relative risk was 1.05 (95% CI 0.94-1.17).

Author Conclusion:

- Controlled metabolic studies of the effect of intake of total and specific R-TFA on CHD risk factors are warranted
- Epidemiological studies of intake of R-TFA and risk of CHD, assessing association for both absolute and energy-adjusted intake are warranted
- Danish population may be one of best populations to study the association between intake of R-TFA and risk of CHD assessing a potential threshold effect
- If further studies confirm that intake of R-TFA is innocuous or protective against CHD, changes in cow feed resulting in higher content of R-TFA along with lower content of saturated fatty acids in milk fat and meat, may contribute to a healthier diet.

Reviewer Comments:

Limitations

- *Article selection methods not described*
- *Search terms used to locate articles not described*
- *Data in studies on intake of ruminant and industrially produced trans-fatty acids may have been based on self-reported dietary intake data which is subject to bias and errors*
- *Unknown how measured dependent or independent variables in studies examined.*

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions

- | | | |
|----|---|-----|
| 1. | Will the answer if true, have a direct bearing on the health of patients? | Yes |
| 2. | Is the outcome or topic something that patients/clients/population groups would care about? | Yes |

3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes
4.	Will the information, if true, require a change in practice?	Yes

Validity Questions

1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search terms used described?	No
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	No
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	No
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	No
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	No
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issues considered? If data from studies were aggregated for meta-analysis, was the procedure described?	???
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	No
10.	Was bias due to the review's funding or sponsorship unlikely?	???